Genus. Species.	Locality.	Height.	Notes.
Cyaniris semiargus, Rott.	Ditto and Rhone V.	Lake level – 4,000′	Singletons in good condition on flowers and grass.
Chrysophanus dorilis, Hufn.	Gorges des Chauderons.	c. 2,000′	One seen and taken (above Montreux).
C. hippothoë, L.	Jor, on road to Jaman.	4,500′	Many ♂♂ and one ♀, all resting on Blue Rampion heads, 9th June, noon chilly after sunshine; v. good condition.
Thecla ilicis, Esp.	Aigle, road to Gorge.	c. 1,700′	Pair, flying together near Privet flowers; ♀ – r.h.w. half missing.
HESPERIIDAE.			
Erynnis tages, L.	Rhone V., etc.	Lake level upwards.	Uncommon.
Syrichtus malvae, L.	Hills near Les Avants.	c. 3,500′	Uncommon.
Carterocephalus palaemon, Pall.	Track to Aigle G.	c. 1,800′	One only, on flower head, 12th June; worn.
Ochlodes venata, Br. & G.	Rhone V. and above Montreux.	Lake level – 2,000′	Not uncommon.

There seems to be a regrettable lack of portable modern books about Swiss butterflies in any language, except *Papillons de la Suisse* by Giggisberg and Hunzinger, 1944, Librairie Payot, Lausanne, which deals in French with the principal butterflies and moths (c. 3 francs Swiss; illustrated). English entomologists still use *The Butterflies of Switzerland, etc.*, by the Rev. G. Wheeler, 1903, Elliott Stock (5/-, no figures), which is very helpful as regards localities and dates of appearances, though the generic names are much out of date; and Volume I of Seitz' *Macrolepidoptera*, with its valuable coloured plates, though that dates back to 1906. Frohawk and other later authors can be used for the species that also occur, or are supposed to occur, in Britain. For help in identifying those that do not, I am greatly indebted to Colonel G. K. Gregson, R.A., D.S.O., and to Mrs Gregson for her assistance and kind hospitality.

OBSERVATIONS ON VARIATION AND HYBRIDISATION IN ZYGAENA LONICERAE, ESP., AND ZYGAENA FILIPENDULAE, L. (LEP.).

By Surgeon Lieutenant Commander H. M. Darlow, R.N., F.R.E.S.

In 1947 five double colonies of *Zygaena lonicerae*, Esp., and *Zygaena filipendulae*, L., were kept under observation with the view to studying variation, hybridisation, parasites and emergence dates, and in an endeavour to establish minor racial differences between isolated colonies, if any. Altogether six hundred and eighty-one imagines were examined, including two hundred and forty-eight *Z. lonicerae*, four hundred and thirty-two *Z. filipendulae*, and one hybrid *filipendulae* × *lonicerae*.

The following is a list of the colonies, their localities and salient characteristics:—

(i) Wickham, Hampshire, on a flowery bank by the roadside.

(a) *Z. lonicerae.* Thirty cocoons were collected on 1st June and a few full-grown larvae were observed. No imagines of any Zygaenid species was seen on the wing. The imagines emerged from the collected cocoons between 17th and 25th June, 22nd June being the optimum date. Only eighteen emerged, death occurring three times in the pre-pupal stage and nine times in the pupal stage. No parasites were found on dissection, and the cause of death is considered to have been trauma at a critical stage of development. Several pupae became impacted on emerging from the cocoons. Only one aberration, a *semi-confusa*, was bred. Twenty worn normal specimens were examined in the field when the colony was revisited on 6th July.

(b) *Z. filipendulae.* Colony discovered on 6th July about 200 yards from colony of *Z. lonicerae.* Eighteen fresh specimens examined, of which two had a reduced sixth spot and were kept for dissection. Of two other minor aberrations one had an abnormally wide hindwing border and the other had markedly pointed apices of all four wings, and confluent fifth and sixth spots. Large numbers of cocoons were found to have been opened, presumably by small birds. (*Vide infra.*)

(ii) Totley, North Derbyshire, on railway embankment.

(a) *Z. lonicerae.* Seventy-three cocoons were collected in the third week of June when no imagines were on the wing, from which imagines emerged without mortality between 24th June and 8th July, the optimum date being 27th June. Sixty imagines were examined in the field on 1st July. There was a marked tendency to crippling both in captivity and in the wild state. Two aberrations were bred in which the hindwings were splashed or shaded with orange in such a way as to suggest disease, or perhaps drenching with an acid meconium. Again many cocoons were discovered with the contents extracted by birds.

(b) *Z. filipendulae.* Colony centred about two hundred yards from the previous one. Between 20th June and 1st July three hundred and fifty-three imagines were examined in the field. There was tendency to reduction of the upper spot of the middle pair, which was quite absent in one specimen and greatly reduced in many others. There was also a tendency to dwarfism at the tail end of the brood. Two unusual aberrations were taken. In one case the spots on the forewings were brick red and the ground colour of the hindwings was pale orange. The other aberration was asymmetrical, the left side being normal and the ground colour of the forewings and hindwing border being replaced by transparent metallic blue, and the spots on the forewing and the ground colour of the hindwing being replaced by pale rose pink. It was quite fresh and undamaged in any way. The antennae and genitalia were normal and symmetrical. Two specimens with a reduced sixth spot were kept for dissection. One male and two females were taken with confluent fifth and sixth spots, rather rounded wings and very narrow hindwing borders, an association of characters found in several other localities, but which appeared out of place in this particular colony in which the hindwing border was on the average rather, and in some cases markedly, broad.

(iii) Maltby Wood, Maltby, South Yorkshire.

(a) *Z. lonicerae.* Five fresh normal imagines were examined on 29th June.

(b) *Z. filipendulae.* Six imagines examined, of which one had a reduced sixth spot and was retained for dissection.

(iv) Lindrick Golf Course, South Yorkshire.

(a) *Z. lonicerae.* Two fresh normal imagines were taken on 2nd July and thirty-four cocoons collected. The imagines emerged between 4th and 13th July, the optimum date being 5th July. There was no mortality. There was a marked tendency to emerge in the evening as opposed to early morning as is usual in *Zygaena*. Of those that emerged on 4th July, one had a minute sixth spot, and when fresh was distinctly greener than normal *Z. lonicerae*. On dissection it proved to be a hybrid. (*Vide infra.*) Another, a female, resembled *Z. filipendulae* very much more closely and probably was of that species, as a single crippled *Z. filipendulae* emerged from the same batch of cocoons on 7th July. All the rest were typical *Z. lonicerae*.

(b) *Z. filipendulae.* Same locality, but were already on the wing when *lonicerae* cocoons were collected Only four were seen and all had been on the wing for some days. Three had fused fifth and sixth spots, rounded wings and very narrow hindwing borders.

(v) Rough country between Alverstoke and Clay Hall, Gosport, Hampshire.

(a) *Z. lonicerae.* Very localised colony discovered on 12th July. Thirty-nine very worn, but otherwise normal, specimens were examined. Three pupae were collected which produced normal imagines on 20th July, very late considering the extremely worn state of those examined in the field.

(b) *Z. filipendulae.* An enormous colony extending for about a mile with local concentrations. One normal male was seen on the wing on 5th July and nine more on 14th July. Seventy-eight pupae were collected between 5th and 14th July which produced imagines between 15th and 25th July. Thirty-six failed to produce imagines (46% mortality), due to various causes discussed below. Two imagines with reduced sixth spots were kept for dissection. One female was taken with confluent fifth and sixth spots and narrow hindwing borders

The analysis of these observations is summarised as follows:—

EMERGENCE DATES.

In Hampshire *Z. lonicerae* emerges about ten days before *Z. filipendulae*, and both species emerge earlier inland than on the coast; whilst in South Yorkshire and North Derbyshire *Z. filipendulae* emerges a week earlier than *Z lonicerae*. Though it may sound like wishful thinking, according to my lists of captures, all those specimens with a reduced sixth spot had an emergence date intermediate between the optimum dates of the two species, but, as is explained below, these are not necessarily hybrids. Emergence dates, however, do seem to have a bearing on hybridisation.

HYBRIDISATION.

Eight male imagines with a reduced sixth spot were dissected but all except one had genitalia indistinguishable from normal *Z. filipen-*

dulae. The one exception was a specimen with a very much reduced sixth spot, which emerged from a batch of *lonicerae* pupae collected at Lindrick. The emergence of this batch extended from 4th to 13th July, and this particular individual emerged on the 4th together with five normal males of *Z. lonicerae* and one female with a small sixth spot, which was probably *Z. filipendulae*.

The genitalia of the hybrid (hybr. *inversa*, Tutt) were identical with those depicted and described by Doctor E. A. Cockayne and myself in 1941. (*Ent. Rec. and Journ. Var.*, LIII, 11, 113.) In the locality in which the pupa was collected *Z. filipendulae* emerged before *Z. lonicerae*. The uncus of *Z. lonicerae* is short and of such a shape as not to prohibit copulation between a female *Z. filipendulae* and male *Z. lonicerae*, which would in this locality be on the wing at the same time. The opposite situation is known to occur and produces the hybrid *intermedia*, Tutt, but for the above reasons this particular hybrid seems far more likely to be the product of a male *lonicerae* and a female *filipendulae*.

Females with a reduced sixth spot are rare, which suggests that all true hybrids may be males, which in turn may help to account for more frequent specific crosses and obvious signs of intergrading between the two species. However, I think this unlikely as female hybrids have certainly been produced on crossing other Zygaenid species.

All the other specimens with reduced sixth spots seem to be referable to ab. *hippocrepidis*, Stephens., and do not appear to be hybrids, even though this year's observations indicated an intermediate emergence date. Actually ab. *hippocrepidis* appeared to be six times commoner where *Z. lonicerae* emerged before *Z. filipendulae*, which is the opposite to what one would expect from the mechanics of the genitalia, if it were a true hybrid. Obviously the whole matter requires large scale breeding experiments and prolonged observation over a number of years before it can be fully elucidated.

In any case ab. *hippocrepidis* appears to grade into the normal form of *Z. filipendulae* and the sixth spot was always found to be not less than half the size of the fifth, whereas in the true hybrid it was very much smaller.

PUPAL MORTALITY.

The mortality in the colonies at Totley, Wickham and Gosport was enormous, owing to attack by what is assumed to be insectiverous birds capable of hovering whilst pecking open the cocoon. Hodgson, *Ent.*, LXXVIII, 990, 176, suggested that House Sparrows or Goldfinches might be the culprits. Goldfinches were seen in all three localities and in large flocks at Gosport. House Sparrows were not seen in any of the three colonies.

The only colony found to be parasitised was that at Gosport. The pupal deaths in captivity amounted to 36 out of 78 (46%). In nineteen cases it was due to one of two species of ichneumon, and in seven cases to the tachinid, *Neopales pavida*, Mg. In twelve cases the cause of death was not obvious.

Why this colony alone should produce so high a pupal mortality from parasitisation is hard to say, but in 1946 the mortality was even higher (55%) and another tachinid species was also involved, *Phryxe vulgaris*, Fall. I am indebted to Mr H. Audcent for identification of the tachinids.